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10/774,844	02/10/2004	Kimio Ozawa	Q79750	9488

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EXAMINER	
CURS, NATHAN M	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/774,844	OZAWA, KIMIO	
	Examiner	Art Unit	
	NATHAN M. CURS	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 April 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3,5-8,10,11,13-15,17-22,24,26,28-31,33,35 and 37-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,5-8,10,11,13-15,17-22,24,26,28-31,33,35 and 37-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/09*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 3, 24, 26, 33 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scarth et al. (US Patent Number 6996323) in view of Chang et al. ("Chang") (US Patent Application Publication No. 2003/0012509).

Regarding claims 1, 24 and 33, Scarth et al. disclose an optical power control apparatus (see FIG. 6), under operational control of a microcontroller inherently running a program (fig. 6 element 660), comprising:

a multiplexer (multiplexer 695) for multiplexing two or more optical signals having different wavelengths (FIG. 6 and column 7, line 67 to col. 8 line 3);

an optical signal transmitting section including a plurality of channels for transmitting optical signals each having a different wavelength, respectively, to the multiplexer, which allows at least part of each optical signal to leak into a channel for an optical signal having another wavelength in at least part of the channels (FIG. 6 and col. 7 lines 18-42 wherein plurality of channels 681-688 which have different wavelength to the multiplexer);

a first optical signal transmission detector (FIG. 6 optical tap couplers 601-608) for detecting the presence or absence of different wavelength optical signals transmitted through channels at an intermediate node based on a determination of whether a power of each optical signal in the respective channel is equal to or lower than a first no-signal criterion level (FIG. 6 and col. 7 lines 22-59 and col. 8 lines 4-8, where the first optical tap couplers detect the optical channel signal powers at the inputs to the variable optical attenuators and LOS of signal calibrations and determinations are made using a LOS threshold for the first taps); and

attenuators set in the channels of the optical signal transmitting section (FIG. 6, the plurality of attenuators (eVOAs 620-655) in the optical signal transmitting section);

a second optical signal transmission detector for detecting LOS using a second no-signal criterion level (FIG. 6 and col. 7 lines 22-59 and col. 8 lines 4-8, where the second optical tap couplers detect the optical channel signal powers at the inputs to the variable optical attenuators and LOS of signal calibrations and determinations are made using a LOS threshold for the second taps) and for detecting, if the first optical signal transmission detector detects the presence of the optical signal, whether an attenuator for attenuating the optical signal in the channel is operating (col. 7 lines 54-67, where determining attenuator operation necessarily requires an actual signal upstream of the attenuator).

Scarth et al. does not explicitly disclose determining whether an attenuator is faulty based on a determination of whether a power of the optical signal in the channel is equal to or lower than a second no-signal criterion level. However, since Scarth et al.

already discloses using both first and second taps to detect LOS, as well as to determine attenuator operation, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the first and second taps and the second LOS threshold to determine if an attenuator has failed, in order to expand the operational monitoring for the attenuators.

Also, Scarth et al. discloses maximally attenuating the channels that have no detected signals (see column 9, lines 59-62; column 10, lines 4-7; column 10, lines 20-25; FIG.6 and FIG.9 where in optical detector inside the optical measured power device 915 detects power signal level at one of the eVOA and if there is loss-of-signal is detected, the microcontroller 950 will set the eVOA to a maximum attenuation level), but does not specifically disclose switches set in the channels, for shutting down the channel where not optical signal has been detected by the first detector such that the shut-down channel does not reach the multiplexer. However, Chang discloses a device that functions as both a VOA and a switch, where both the VOA and switching functionality are achieved by mirror adjustment (figs. 5-7 and paragraphs 0054-0056 and figs. 9 and 10 and paragraphs 0061), including completely blocking a channel by switching the signal path away from any downstream waveguide (fig. 14 and paragraph 0063). It would have been obvious to one of ordinary skill in the art at the time of the invention to use VOA-switch devices like that of Chang for the signal level adjusting section set of Scarth et al., attenuating the channels when variable attenuation is required and completely blocking the channels before they reach the multiplexer by switching the respective signal paths away from downstream waveguides when there

are no signals detected by the first detector, with the signal level adjusting section controller further acting as a switch controller for the case of controlling the VOA-switch device to completely block the channel, to provide the advantage of eliminating any possible bleed-through of optical signal through the attenuator by completely diverting such signal away from downstream waveguides.

Regarding claims 3, 26 and 35, Scarth et al. discloses an optical power control apparatus (see FIG. 6), under operational control of a microcontroller inherently running a program (fig. 6 element 660), comprising:

a demultiplexer at an optical interconnect node which receives a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each, and demultiplexes the multiplexed optical signal into the optical signals having different wavelengths corresponding to the respective channels (FIG. 6 and col. 7 lines 22-35 where in a demultiplexer inherently exists inside the microcontroller box 660 which receives the WDM input 680 having multiplexing optical signals with different wavelength corresponding to the respective channels);

demultiplexed signal level detectors set (plurality of optical tap couplers 601-608) in the channels, respectively, for detecting the power levels of the optical signals (see column 7, lines 22-59 and FIG. 6);

a first optical signal detector (an optical signal detector inside optical measured power at an eVOA 715) for deciding at a controller of the interconnect node whether or not the power level of each optical signal detected by the demultiplexed signal level detector set in each channel is lower than a first criterion level which is the lowest level

of a received optical signal to detect optical signal input with respect to each channel (see column 7, lines 22-67; column 8, lines 9-11; column 8, lines 49-54; FIG. 6 and FIG.7, where the first optical tap couplers detect the optical channel signal powers at the inputs to the variable optical attenuators and LOS of signal calibrations and determinations are made using a LOS threshold for the first taps, and where in the optical signal detector inside the optical measure power device 715 measures the power level of each demultiplexed signal into an eVOA and decides whether or not each channel signal is lower than the received target power level Ptarget);

a second optical signal transmission detector for detecting channel power levels ands LOS using a second no-signal criterion level (FIG. 6 and col. 7 lines 18-59 and col. 8 lines 4-8, where the second optical tap couplers detect the optical channel signal powers at the inputs to the variable optical attenuators and LOS of signal calibrations and determinations are made using a LOS threshold for the second taps) and for detecting, if the first optical signal transmission detector detects the presence of the optical signal, whether an attenuator for attenuating the optical signal in the channel is operating (col. 7 lines 54-67, where determining attenuator operation necessarily requires an actual signal upstream of the attenuator).

signal level adjusting sections set (eVOA 620-655) in the channels, respectively, for adjusting the levels of the optical signals of the respective channels demultiplexed by the demultiplexer (see column 7, lines 22-59 and FIG. 6);

a multiplexer of the interconnect node (multiplexer 695) for multiplexing the optical signals of the respective channels, which have passed through the signal level adjusting sections (see column 7 line 67 to col. 9 line 3 and FIG. 6); and

a signal level adjusting section controller (microcontroller 660) which controls the respective signal level adjusting sections so as to attenuate the level of the optical signal of the channel where no optical signal input has been detected by the optical signal detector to the greatest extent possible (see column 9, lines 59-62; column 10, lines 4-7; column 10, lines 20-25; FIG. 6 and FIG.9 where in optical detector inside the optical measured power device 915 detects power signal level at one of the eVOA and if there is loss-of-signal is detected, the microcontroller 950 will set the eVOA to a maximum attenuation level).

Scarth et al. does not explicitly disclose the additional process of determining whether an attenuator is faulty based on a determination of whether a power of the optical signal in the channel is equal to or lower than a second no-signal criterion level. However, since Scarth et al. already discloses using both first and second taps to detect LOS, as well as to determine attenuator operation, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the first and second taps and the second LOS threshold to determine if an attenuator has failed, in order to expand the operational monitoring for the attenuators.

Also, Scarth et al. discloses maximally attenuating the channels that have no signals, but does not specifically disclose switches set in the channels, for passing or stopping the signals, with a switch controller controlling the respective switches to shut

down the respective channels where not optical signal has been detected by the first detectors. However, Chang discloses a device that functions as both a VOA and a switch, where both the VOA and switching functionality are achieved by mirror adjustment (figs. 5-7 and paragraphs 0054-0056 and figs. 9 and 10 and paragraphs 0061), including completely blocking a channel by switching the signal path away from any downstream waveguide (fig. 14 and paragraph 0063). It would have been obvious to one of ordinary skill in the art at the time of the invention to use VOA-switch devices like that of Chang for the signal level adjusting section set of Scarth et al., attenuating the channels when variable attenuation is required and completely blocking the channels by switching the respective signal paths away from downstream waveguides when there are no signals detected by the first detectors, with the signal level adjusting section controller further acting as a switch controller for the case of controlling the VOA-switch device to completely block the channel, to provide the advantage of eliminating any possible bleed-through of optical signal through the attenuator by completely diverting such signal away from downstream waveguides.

3. Claims 5, 28 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scarth et al. (US Patent Number 6996323) in view of Chang (US Patent Application Publication No. 2003/0012509), and further in view of Shimokawa et al. (US Patent Number 6445471).

Regarding claims 5 and 28 and 37, Scarth et al. disclose an optical power control apparatus at an optical interconnect node (FIG. 5), under operational control of a microcontroller inherently running a program (FIG. 5 element 560) comprising:

a demultiplexer which receives a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each wavelength, and demultiplexes the multiplexed optical signal into optical signals having different wavelengths corresponding to the respective channels (see column 6, lines 45-48 and FIG.5 where in a demultiplexer inherently exists inside the microcontroller box 560 which receives the WDM input 580 having multiplexing optical signals with different wavelength corresponding to the respective channels);

an optical signal detector (an optical signal detector inside optical measured power at an eVOA 715) for deciding at a controller whether or not the power level of the optical signal detected by the wavelength-specific signal level detector (optical coupler 501) with respect to each wavelength is lower than the lowest level of a received optical signal to detect optical signal input in each channel (see column 6, lines 47-49; column 8, lines 9-11; column 8, lines 49-54; FIG.5 and FIG.7 where in the optical signal detector inside the optical measure power device 715 measures the power level of each demultiplexed signal detected by optical coupler 501 at the eVOA and decides whether or not each channel signal is lower than the received target power level Ptarget);

signal level adjusting sections (eVOA 520-555) set in the channels, respectively, for adjusting the power levels of the optical signals of the respective channels demultiplexed by the demultiplexer (see column 7,lines 1-14 and FIG.5);

a multiplexer (multiplexer 595) for multiplexing the optical signals of the respective channels, which have passed through the signal level adjusting sections (see column 7,lines 14-17 and FIG.5); and

a signal level adjusting section controller (microcontroller 960) which controls the respective signal level adjusting sections so as to attenuate the power level of the optical signal of a channel where no optical signal input has been detected by the optical signal detector to the greatest extent possible (see column 9, lines 59-62; column 10, lines 4-7; column 10, lines 20-25; FIG.5 and FIG.9 where in optical detector inside the optical measured power device 915 detects power signal level at one of the eVOA and if there is loss-of-signal is detected, the microcontroller 950 will set the eVOA to a maximum attenuation level).

Scarth et al. discloses maximally attenuating the channels that have no detected signals (see column 9, lines 59-62; column 10, lines 4-7; column 10, lines 20-25; FIG.5 and FIG.9 where in optical detector inside the optical measured power device 915 detects power signal level at one of the eVOA and if there is loss-of-signal is detected, the microcontroller 950 will set the eVOA to a maximum attenuation level), but does not specifically disclose switches set in the channels, for shutting down the channel where not optical signal has been detected. However, Chang discloses a device that functions as both a VOA and a switch, where both the VOA and switching functionality are achieved by mirror adjustment (figs. 5-7 and paragraphs 0054-0056 and figs. 9 and 10 and paragraphs 0061), including completely blocking a channel by switching the signal path away from any downstream waveguide (fig. 14 and paragraph 0063). It would

have been obvious to one of ordinary skill in the art at the time of the invention to use VOA-switch devices like that of Chang for the signal level adjusting section set of Scarth et al., attenuating the channels when variable attenuation is required and completely blocking the channels by switching the respective signal paths away from downstream waveguides when there are no signals, with the signal level adjusting section controller further acting as a switch controller for the case of controlling the VOA-switch device to completely block the channel, to provide the advantage of eliminating any possible bleed-through of optical signal through the attenuator by completely diverting such signal away from downstream waveguides.

Also, even though Scarth et al. disclose the optical communication apparatus includes the functions of the demultiplexer, the optical signal detector, the wavelength-specific signal level detector, the signal level adjusting sections, the multiplexer and the signal level adjusting section controller, including detecting optical channel power levels before the attenuators (fig. 5), Scarth et al. fail to specifically disclose a spectrum analyzer for analyzing the spectrum of the multiplexed optical signal before being demultiplexed by the demultiplexer and a wavelength-specific signal level detector for detecting the power levels of the optical signals of the respective channels based on the spectrum obtained by the spectrum analyzer.

Shimokawa et al. disclose a spectrum analyzer (fig. 3, optical spectrum analyzer 1209) for analyzing the spectrum of a multiplexed WDM optical signal and a wavelength-specific signal level detector (PD 1208 for each wavelength) for detecting the power levels of the optical signals of the respective channels based on the analysis

result obtained by the spectrum analyzer (see column 1 line 66 to col. 2 line 26 and FIG.3 where in optical spectrum analyzer 1209 analyzes peak power of the optical signals, and where the photodetectors detect the power level of the signals, which power levels are based on the spectrum determined by spectrum analyzer 1209 because they are determined by the attenuator 1203 which is controlled based on the spectrum analyzer results).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to modify the combination, using a spectrum analyzer and photodetectors arrangement like that of Shimokawa et al., but with the spectrum analyzer before the optical demultiplexer (AWG), considering that Scarth's tap couplers for channel measurement are located upstream from the attenuators, to provide the benefit of analyzing the incoming power level of the single WDM signal before the demultiplexer adds inherent insertion losses that affect the spectrum.

4. Claims 6, 10, 13, 29 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scarth et al. (US Patent Number 6996323) in view of Shimokawa et al. (US Patent Number 6445471).

Regarding claims 6 and 29 and 38, Scarth et al. disclose an optical power control apparatus at an optical interconnect node (FIG. 5), under operational control of a microcontroller inherently running a program (FIG. 5 element 560) comprising:

a demultiplexer which receives a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated

for each wavelength, and demultiplexes the multiplexed optical signal into optical signals having different wavelengths corresponding to the respective channels (see column 6, lines 45-48 and FIG.5 where in a demultiplexer inherently exists inside the microcontroller box 560 which receives the WDM input 580 having multiplexing optical signals with different wavelength corresponding to the respective channels);

an optical signal detector (an optical signal detector inside optical measured power at an eVOA 715) for deciding whether or not the power level of the optical signal detected by the wavelength-specific signal level detector (optical coupler 501) with respect to each wavelength is lower than the lowest level of a received optical signal to detect optical signal input in each channel (see column 6, lines 47-49; column 8, lines 9-11; column 8, lines 49-54; FIG.5 and FIG.7 where in the optical signal detector inside the optical measure power device 715 measures the power level of each demultiplexed signal detected by optical coupler 501 at the eVOA and decides whether or not each channel signal is lower than the received target power level Ptarget);

signal level adjusting sections (eVOA 520-555) set in the channels, respectively, for adjusting the power levels of the optical signals of the respective channels demultiplexed by the demultiplexer (see column 7,lines 1-14 and FIG.5);

a multiplexer (multiplexer 595) for multiplexing the optical signals of the respective channels, which have passed through the signal level adjusting sections (see column 7,lines 14-17 and FIG.5); and

a signal level adjusting section controller (microcontroller 960) which controls the respective signal level adjusting sections so as to attenuate the power level of the

optical signal of a channel where no optical signal input has been detected by the optical signal detector to the greatest extent possible (see column 9, lines 59-62; column 10, lines 4-7; column 10, lines 20-25; FIG.5 and FIG.9 where in optical detector inside the optical measured power device 915 detects power signal level at one of the eVOA and if there is loss-of-signal is detected, the microcontroller 950 will set the eVOA to a maximum attenuation level).

Even though Scarth et al. disclose the optical communication apparatus includes the functions of the demultiplexer, the optical signal detector, the wavelength-specific signal level detector, the signal level adjusting sections, the multiplexer and the signal level adjusting section controller, including detecting optical channel power levels before the attenuators (fig. 5), Scarth et al. fail to specifically disclose a spectrum analyzer for analyzing the spectrum of the multiplexed optical signal before being demultiplexed by the demultiplexer and a wavelength-specific signal level detector for detecting the power levels of the optical signals of the respective channels based on the spectrum obtained by the spectrum analyzer.

Shimokawa et al. disclose a spectrum analyzer (fig. 3, optical spectrum analyzer 1209) for analyzing the spectrum of a multiplexed WDM optical signal and a wavelength-specific signal level detector (PD 1208 for each wavelength) for detecting the power levels of the optical signals of the respective channels based on the analysis result obtained by the spectrum analyzer (see column 1 line 66 to col. 2 line 26 and FIG.3 where in optical spectrum analyzer 1209 analyzes peak power of the optical signals, and where the photodetectors detect the power level of the signals, which

power levels are based on the spectrum determined by spectrum analyzer 1209 because they are determined by the attenuator 1203 which is controlled based on the spectrum analyzer results).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to modify Scarth et al., using a spectrum analyzer and photodetectors arrangement like that of Shimokawa et al., but with the spectrum analyzer before the optical demultiplexer (AWG), considering that Scarth's tap couplers for channel measurement are located upstream from the attenuators, to provide the benefit of analyzing the incoming power level of the single WDM signal before the demultiplexer adds inherent insertion losses that affect the spectrum.

Regarding claims 10 and 13, the combination of Scarth et al. and Shimokawa et al. discloses everything claimed as applied above for claim 6. In addition, Scarth et al. disclose the apparatus further includes: a signal level adjuster/attenuator capable of increasing the insertion loss to such level that an input optical signal is substantially shut off (col. 9 line 59 to col. 10 line 33, applicable to the figs. 5 and 6 embodiments, where maximum attenuation for the eVOAs equals maximum insertion loss), an adjusted/attenuated signal level detector (an attenuated signal level detector) (indicated by fig. 6 optical couplers 609-616) for detecting the power level of the optical signal which has passed through the signal level adjuster (see fig. 6 and col. 7 line 22 to col. 8 line 58 where in optical tap couplers 609-616 are used for detecting signal power at the output of the eVOAs); and a signal level adjustment/attenuation controller (an insertion loss controller) (the microcontroller for controlling the eVOAs) for controlling the

adjustment of signal level performed by the signal level adjuster so that the power level of each optical signal detected by the adjusted signal level detector becomes a prescribed value (see column 9,lines 9-11; column 9,lines 20-22; column 9,lines 35-58; FIGS. 3, 6 and 8 where the microcontroller controls each eVOA signal level and optical power signal output from the eVOA is detected by the optical tap coupler inside the optical measured power device 815 and becomes prescribed value as loss-of-signals, valid power measurement and so on).

5. Claims 7, 21, 30 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scarth et al. (US Patent Number 6996323) in view of Chang (US Patent Application Publication No. 2003/0012509), and further in view of Kawasaki et al. (US Patent 6288836).

Regarding claims 7, 30 and 39, Scarth et al. disclose an optical power control apparatus at an optical interconnect node (FIG. 5), under operational control of a microcontroller inherently running a program (FIG. 5 element 560), comprising: a demultiplexer which receives a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each wavelength, and demultiplexes the multiplexed optical signal into optical signals having different wavelengths corresponding to the respective channels (see column 6, lines 45-48 and FIG.5 where in a demultiplexer inherently exists inside the microcontroller box 560 which receives the WDM input 580 having multiplexing optical signals with different wavelength corresponding to the respective channels);

signal level adjusting sections set (eVOA 520-555) in the channels, respectively, for adjusting power levels of the optical signals of the respective channels demultiplexed by the demultiplexer (see column 7,lines 1-14 and FIG.5);

a multiplexer (multiplexer 595) for multiplexing the optical signals of the respective channels, which have passed through the signal level adjusting sections (see column 7,lines 14-17 and FIG.5).

a signal level adjusting section controller (microcontroller 960) which controls the respective signal level adjusting sections so as to attenuate the power level of the optical signal of a channel where no optical signal input has been detected by the optical signal detector to the greatest extent possible (see column 9, lines 59-62; column 10, lines 4-7; column 10, lines 20-25; FIG.5 and FIG.9 where in optical detector inside the optical measured power device 915 detects power signal level at one of the eVOA and if there is loss-of-signal is detected, the microcontroller 950 will set the eVOA to a maximum attenuation level).

Scarth et al. discloses maximally attenuating the channels that have no detected signals (see column 9, lines 59-62; column 10, lines 4-7; column 10, lines 20-25; FIG.5 and FIG.9 where in optical detector inside the optical measured power device 915 detects power signal level at one of the eVOA and if there is loss-of-signal is detected, the microcontroller 950 will set the eVOA to a maximum attenuation level), but does not specifically disclose switches set in the channels, for shutting down the channel where not optical signal has been detected. However, Chang discloses a device that functions as both a VOA and a switch, where both the VOA and switching functionality are

achieved by mirror adjustment (figs. 5-7 and paragraphs 0054-0056 and figs. 9 and 10 and paragraphs 0061), including completely blocking a channel by switching the signal path away from any downstream waveguide (fig. 14 and paragraph 0063). It would have been obvious to one of ordinary skill in the art at the time of the invention to use VOA-switch devices like that of Chang for the signal level adjusting section set of Scarth et al., attenuating the channels when variable attenuation is required and completely blocking the channels by switching the respective signal paths away from downstream waveguides when there are no signals, with the signal level adjusting section controller further acting as a switch controller for the case of controlling the VOA-switch device to completely block the channel, to provide the advantage of eliminating any possible bleed-through of optical signal through the attenuator by completely diverting such signal away from downstream waveguides.

Also, even though Scarth et al. disclose the optical communication apparatus includes the functions of the demultiplexer, the signal level adjusting sections, the multiplexer, Scarth et al. fail to specifically disclose a supervisory signal receiver for receiving a supervisory signal indicating whether there is transmission of at least part of the optical signals of the respective channels which form the multiplexed optical signal input to the demultiplexer and that the signal level adjusting section controller acts according to the supervisory signal receiver determining that no optical signal was transmitted to the channel.

Kawasaki et al. disclose a supervisory signal receiver (supervising circuit 56) for receiving a supervisory signal indicating whether there is transmission of at least part of

the optical signals of the respective channels which form the multiplexed optical signal (see column 8, lines 42-53 and FIG.13 where in the supervising circuit 56 can detect the supervisory signal which indicates the number of optical signal channels being used in the WDM optical signal and supplies the detected signal channels to a control circuit 54 for the variable optical attenuator 28).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to modify the combination, implementing a supervisory signal and supervisory signal circuit like that of Kawasaki et al. for the signal-presence detection function of the apparatus of the combination., to provide the benefit of determining which WDM channels are in use based on a single channel detection instead of having to analyze each channel individually for signal presence.

Regarding claim 21, the combination of Scarth et al., Chang and Kawasaki et al. discloses everything claimed as applied above for claim 7. In addition, Kawasaki et al. disclose wherein the supervisory signal receiver is an OSC (Optical Server Channel) terminator that terminates an OSC signal (Kawasaki et al.: column 8, lines 42-53 and FIG.13, where the supervisory signal receiver reads on an OSC terminator).

6. Claims 8, 11, 14, 22, 31 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scarth et al. (US Patent Number 6996323) in view of Kawasaki et al. (US Patent 6288836).

Regarding claims 8, 31 and 40, Scarth et al. disclose an optical power control apparatus at an optical interconnect node (FIG. 5), under operational control of a

microcontroller inherently running a program (FIG. 5 element 560), comprising: a demultiplexer which receives a multiplexed optical signal obtained by multiplexing optical signals having different wavelengths, one channel being allocated for each wavelength, and demultiplexes the multiplexed optical signal into optical signals having different wavelengths corresponding to the respective channels (see column 6, lines 45-48 and FIG.5 where in a demultiplexer inherently exists inside the microcontroller box 560 which receives the WDM input 580 having multiplexing optical signals with different wavelength corresponding to the respective channels);

signal level adjusting sections set (eVOA 520-555) in the channels, respectively, for adjusting power levels of the optical signals of the respective channels demultiplexed by the demultiplexer (see column 7,lines 1-14 and FIG.5);

a multiplexer (multiplexer 595) for multiplexing the optical signals of the respective channels, which have passed through the signal level adjusting sections (see column 7,lines 14-17 and FIG.5).

a signal level adjusting section controller (microcontroller 960) which controls the respective signal level adjusting sections so as to attenuate the power level of the optical signal of a channel where no optical signal input has been detected by the optical signal detector to the greatest extent possible (see column 9, lines 59-62; column 10, lines 4-7; column 10, lines 20-25; FIG.5 and FIG.9 where in optical detector inside the optical measured power device 915 detects power signal level at one of the eVOA and if there is loss-of-signal is detected, the microcontroller 950 will set the eVOA to a maximum attenuation level).

Even though Scarth et al. disclose the optical communication apparatus includes the functions of the demultiplexer, the signal level adjusting sections, the multiplexer, Scarth et al. fail to specifically disclose a supervisory signal receiver for receiving a supervisory signal indicating whether there is transmission of at least part of the optical signals of the respective channels which form the multiplexed optical signal input to the demultiplexer and that the signal level adjusting section controller acts according to the supervisory signal receiver determining that no optical signal was transmitted to the channel.

Kawasaki et al. disclose a supervisory signal receiver (supervising circuit 56) for receiving a supervisory signal indicating whether there is transmission of at least part of the optical signals of the respective channels which form the multiplexed optical signal (see column 8, lines 42-53 and col. 9 lines 1-4 and FIG.13 where in the supervising circuit 56 can detect the supervisory signal which indicates the number of optical signal channels being used in the WDM optical signal and supplies the detected signal channels to a control circuit 54 for the variable optical attenuator 28).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to modify Scarth, implementing a supervisory signal and supervisory signal circuit like that of Kawasaki et al. for the signal-presence detection function of the apparatus of Scarth et al., to provide the benefit of determining which WDM channels are in use based on a single channel detection instead of having to analyze each channel individually for signal presence.

Regarding claims 11 and 14, the combination of Scarth et al. and Kawasaki et al. discloses everything claimed as applied above for claim 8. In addition, Scarth et al. disclose the apparatus further includes: a signal level adjuster/attenuator capable of increasing the insertion loss to such level that an input optical signal is substantially shut off (col. 9 line 59 to col. 10 line 33, applicable to the figs. 5 and 6 embodiments, where maximum attenuation for the eVOAs equals maximum insertion loss), an adjusted/attenuated signal level detector (an attenuated signal level detector) (indicated by fig. 6 optical couplers 609-616) for detecting the power level of the optical signal which has passed through the signal level adjuster (see fig. 6 and col. 7 line 22 to col. 8 line 58 where in optical tap couplers 609-616 are used for detecting signal power at the output of the eVOAs); and a signal level adjustment/attenuation controller (an insertion loss controller) (the microcontroller for controlling the eVOAs) for controlling the adjustment of signal level performed by the signal level adjuster so that the power level of each optical signal detected by the adjusted signal level detector becomes a prescribed value (see column 9,lines 9-11; column 9,lines 20-22; column 9,lines 35-58; FIGS. 3, 6 and 8 where the microcontroller controls each eVOA signal level and optical power signal output from the eVOA is detected by the optical tap coupler inside the optical measured power device 815 and becomes prescribed value as loss-of-signals, valid power measurement and so on).

Regarding claim 22, the combination of Scarth et al. and Kawasaki et al. discloses everything claimed as applied above for claim 8. In addition, Kawasaki et al. disclose wherein the supervisory signal receiver is an OSC (Optical Server Channel)

terminator that terminates an OSC signal (Kawasaki et al.: column 8, lines 42-53 and FIG.13, where the supervisory signal receiver reads on an OSC terminator).

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scarth et al. (US Patent Number 6996323) in view of Chang (US Patent Application Publication No. 2003/0012509), as applied to claims 1, 3, 24, 26, 33 and 35 above, and further in view of Shimomura et al. (US Pub Number 2002/0126372).

Regarding claim 15, the combination of Scarth et al. and Change discloses everything claimed as applied above for claim 3. However, the combination does not specifically disclose that the demultiplexer and the multiplexer are formed of arrayed waveguide gratings, respectively.

Shimomura et al. disclose plurality of optical variable attenuators 251-254 are inserted into the optical transmission lines 131-134 between optical demultiplexer 120 and multiplexer 140 which are made of array waveguide grating type (see paragraphs [0233];[0234] lines 1-6 and FIG.23).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to implement the array waveguide grating type optical multiplexer and demultiplexer for the optical multiplexer and demultiplexer device of the combination because Scarth et al. is relatively silent about the specific detail of optical multiplexer and demultiplexer device and Shimomura et al. speak into the silent with more detail about what kinds of devices to use in actually implementing optical multiplexers and demultiplexers in a similar functional scenario.

8. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scarth et al. (US Patent Number 6996323) in view of Chang (US Patent Application Publication No. 2003/0012509), and further in view of Shimokawa et al. (US Patent Number 6445471) as applied to claims 5, 28 and 37 above, and further in view of Shimomura et al. (US Pub Number 2002/0126372).

Regarding claim 17, the combination of Scarth et al., Chang and Shimokawa et al. disclose everything claimed as applied above for claim 5. However, they fail to specifically disclose that the demultiplexer and the multiplexer are each formed of arrayed waveguide gratings.

Shimomura et al. disclose plurality of optical variable attenuators 251-254 are inserted into the optical transmission lines 131-134 between optical demultiplexer 120 and multiplexer 140 which are made of array waveguide grating type (see paragraphs [0233];[0234] lines 1-6 and FIG.23).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to implement the array waveguide grating type optical multiplexer and demultiplexer for the optical multiplexer and demultiplexer device of the combination because Scarth et al. is relatively silent about the specific detail of optical multiplexer and demultiplexer device and Shimomura et al. speak into the silent with more detail about what kinds of devices to use in actually implementing optical multiplexers and demultiplexers in a similar functional scenario.

9. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scarth et al. (US Patent Number 6996323) in view of Shimokawa et al. (US Patent Number 6445471) as applied to claims 6, 10, 13, 29 and 38 above, and further in view of Shimomura et al. (US Pub Number 2002/0126372).

Regarding claim 18, the combination of Scarth et al. and Shimokawa et al. disclose everything claimed as applied above for claim 6. However, they both fail to specifically disclose that the demultiplexer and the multiplexer are each formed of arrayed waveguide gratings. Shimomura et al. disclose plurality of optical variable attenuators 251-254 are inserted into the optical transmission lines 131-134 between optical demultiplexer 120 and multiplexer 140 which are made of array waveguide grating type (see paragraphs [0233];[0234] lines 1-6 and FIG.23).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to implement the array waveguide grating type optical multiplexer and demultiplexer for the optical multiplexer and demultiplexer device of the combination because Scarth et al. is relatively silent about the specific detail of optical multiplexer and demultiplexer device and Shimomura et al. speak into the silent with more detail about what kinds of devices to use in actually implementing optical multiplexers and demultiplexers in a similar functional scenario.

10. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scarth et al. (US Patent Number 6996323) in view of Chang (US Patent Application Publication No. 2003/0012509), and further in view of Kawasaki et al. (US Patent 6288836) as

applied to claims 7, 21, 30 and 39 above, and further in view of Shimomura et al. (US Pub Number 2002/0126372).

Regarding claim 19, the combination of Scarth et al., Chang and Kawasaki et al. discloses everything claimed as applied above for claim 7. However, they both fail to specifically disclose that the demultiplexer and the multiplexer are each formed of arrayed waveguide gratings. Shimomura et al. disclose plurality of optical variable attenuators 251-254 are inserted into the optical transmission lines 131-134 between optical demultiplexer 120 and multiplexer 140 which are made of array waveguide grating type (see paragraphs [0233];[0234] lines 1-6 and FIG.23).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to implement the array waveguide grating type optical multiplexer and demultiplexer for the optical multiplexer and demultiplexer device of the combination because Scarth et al. is relatively silent about the specific detail of optical multiplexer and demultiplexer device and Shimomura et al. speak into the silent with more detail about what kinds of devices to use in actually implementing optical multiplexers and demultiplexers in a similar functional scenario.

11. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Scarth et al. (US Patent Number 6996323) in view of Kawasaki et al. (US Patent 6288836) as applied to claims 8, 11, 14, 22, 31 and 40 above, and further in view of Shimomura et al. (US Pub Number 2002/0126372).

Regarding claim 20, the combination of Scarth et al. and Kawasaki et al. discloses everything claimed as applied above for claim 8. However, they both fail to specifically disclose that the demultiplexer and the multiplexer are each formed of arrayed waveguide gratings.

Shimomura et al. disclose plurality of optical variable attenuators 251-254 are inserted into the optical transmission lines 131-134 between optical demultiplexer 120 and multiplexer 140 which are made of array waveguide grating type (see paragraphs [0233];[0234] lines 1-6 and FIG.23).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to implement the array waveguide grating type optical multiplexer and demultiplexer for the optical multiplexer and demultiplexer device of the combination because Scarth et al. is relatively silent about the specific detail of optical multiplexer and demultiplexer device and Shimomura et al. speak into the silent with more detail about what kinds of devices to use in actually implementing optical multiplexers and demultiplexers in a similar functional scenario.

Response to Arguments

12. Applicant's arguments filed 6 April 2009 have been fully considered but they are not persuasive.

Regarding claims 1, 2, 24, 26, 33 and 35, Applicant argues that the combination does not disclose the added “second” detector/criterion/etc. limitations. This argument is not persuasive in view of the modified rejections based on Scarth fig. 6 embodiment

instead of fig. 5 embodiment. Further, Applicant's citation of Scarth's discussion of advantages of less hardware, reduced power, etc. is not persuasive, because Scarth fig. 6 already has both the before-attenuator and after-attenuator taps, and this is within what Scarth considers his invention, and is thus not discredited.

Regarding claims 5, 6, 10, 13, 17, 18, 28, 29, 37 and 38, Applicant argues that one of ordinary skill in the art at the time of the invention would not have used a spectrum analyzer because of its price and over-engineering, in light of Scarth discussion of less hardware, reduced power, etc. First, Applicant is making generalizations about spectrum analyzers, without providing any evidence that Shimokawa's spectrum analyzer is actually either expensive or over-engineered. Second, Scarth already discloses a relatively complex and arrangement for monitoring wavelengths using a set of parts that are not necessarily inexpensive. Further, Scarth doesn't discredit spectrum analyzers per se and Scarth's discussion of "less hardware", "reduced power", etc. is vague and relative when considering Scarth's own wavelength monitoring arrangement vs. a spectrum analyzer. Thus, it's not reasonable to conclude that Scarth is discrediting spectrum analyzers or that Scarth would definitely consider them too expensive, complex, etc.

Regarding claims 7, 8, 11, 14, 19-22, 30, 31, 39 and 40, Applicant argues again that Kawasaki's supervisory circuit merely determines how many channels (i.e. the total number) are present, and does not determine whether an optical signal was transmitted to a particular channel. However, as previously noted, Kawasaki col. 9 lines 1-4 sheds light on the meaning of the "number of channels" information provided by the

supervisory signal to the supervisory circuit. Namely, this section says that the result of the supervisory signal based attenuation control is that "each channel of the WDM signal light can be automatically controlled". This is evidence that the supervisory signal's "number of channels" information is not merely a total channel count number; rather it *necessarily* includes information about which specific channels are present, in order for the automatic control "each channel of the WDM signal light" to be possible. Contrary to Applicant's assertion that such necessity does not exist, there is no way to control individual channel levels of the WDM signal if the supervisory circuit only knows the total number of channels.

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATHAN M. CURS whose telephone number is (571)272-3028. The examiner can normally be reached on 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000

/NATHAN M CURS/

Primary Examiner, Art Unit 2613